Learning Through the Arts: Lessons of Engagement

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In this article, we describe the effects on student achievement and attitudes of a Canadian school-wide, arts education approach, *Learning Through the Arts* (*LTTA*). Our sample included over 6000 students and their parents, teachers, and principals. We gathered data, both at the outset and after three years of involvement in *LTTA* on student achievement, student attitudes towards arts and schooling, and out-of-school activities. We found no baseline differences in achievement nor in socioeconomic status in the *LTTA* and control schools. At the end of three years, the grade-6 *LTTA* students scored significantly higher on tests of computation than students in control schools. We conclude the article with suggestions for extending this longitudinal research.

Keywords: arts-based learning, arts-based schooling, engagement, arts and achievement

Dans cet article, les auteures décrivent les effets sur le rendement scolaire et les attitudes des élèves du programme *Apprendre par les arts (APLA)* implanté dans un réseau scolaire. L'échantillon regroupait plus de 6000 élèves, les parents, les enseignants et les directeurs des écoles canadiennes participantes. Les auteurs ont colligé, au début d'implantation du programme APLA et après une période de trois ans d'application, des données sur le rendement des élèves, leurs attitudes envers les arts et l'école et les activités extrascolaires. Il n'y avait aucune différence de base quant au rendement ou au statut socioéconomique entre les écoles ayant recours au programme APLA et les écoles témoins. Au terme de l'étude de trois ans, les élèves qui ont appris avec le programme APLA ont obtenu en mathématiques des notes nettement supérieures à celles des élèves des écoles témoins.

Mots clés: enseignement et apprentissage par les arts, participation, arts et rendement des élèves.

In recognition of the importance of the arts and in response to the declining support for arts programs in schools, some public schools have become specialized arts schools with teachers and students selected for their arts interests and experiences. Although students benefit from attending such schools, Pitman (1998) observes that, "Setting up elite arts schools for those

who see their future employment in the arts does not address the main concern — that every child must be brought to a level of arts literacy that will make life joyful and productive" (p. 60).

Several models have been developed to increase the level of arts literacy in public schools across Canada (Vagianos, 1999), but empirical research assessing such models is scarce. The research reported in this article describes a few aspects of an extensive empirical study on one such model: *Learning Through the Arts* (*LTTA*). In the *LTTA* elementary education model, professional artists work directly with students after developing curricula with teachers (for a full description of the program, see Elster, 2001). Our research reports on the effectiveness of the *LTTA* program for the revitalization of elementary education as experienced by students and their parents, teachers, administrators, and artists.

RELATED LITERATURE

Over the past century, the arts have enjoyed prominence during times of progressive reforms, but regarded as an extra during the "back-to-basics" movements (Oreck, 2002). Between 1950 and 1980, arts education, under the mantle of aesthetic education, was justified by aesthetic or intrinsic ends and not, for example, to enhance self-esteem or improve reading skills (Reimer, 1970). To conduct research on the non-arts effects of arts education was "out of vogue at best, out of touch at worst" (Cutietta, Hamann, & Walker, 1995, p. 5).

In the mid-1970s, Eisner (1974) called for the evaluation of arts programs. As a result, a growing body of evidence suggests that arts education positively affects aspects of living and learning beyond the intrinsic values of the arts themselves. Reported benefits of the arts include the development of the imagination (Greene, 1995), greater motivation to learn (Csikszentmihalyi, 1997), increased student creativity, lower dropout rates, and increased social skills (Catterall, 1998; Luftig, 1995). Researchers also report that students involved in the arts exhibit higher academic achievement than their peers who are not involved in the arts (Catterall, 1998; Catterall, Chapleau, & Iwanaga, 1999; Deasy, 2002; Fowler, 1996; Hetland, 2000; Luftig, 1995; Murfee, 1995; Welch & Greene, 1995). Because much of this research is correlational in nature, Winner and Cooper (2000) caution researchers and others not to go beyond the evidence to make causal claims about the arts and academic achievement.

There is another concern associated with research on the arts and academic achievement. By suggesting that the arts might serve as handmaidens to other subjects, a danger exists that the arts will not be

valued for their distinct contributions to education (Winner & Hetland, 2000). Although arts educators have tried to strengthen the position of the arts by claiming that the arts enhance learning in other subjects, Winner and Cooper (2000) argue that it is foolhardy to expect the arts to be as skilled in teaching of those subjects themselves. They further argue that "advocates should refrain from making utilitarian arguments in favor of the arts [because] as soon as we justify arts by their power to affect learning in an academic area, we make the arts vulnerable" (pp. 66–67). Justification for the arts comes from the important and unique contributions that arise from arts education. For example, Eisner (1994, 2002) and Greene (1995) note the importance of the arts for experiencing the joy of creating, developing attention to detail, and learning ways to express thoughts, knowledge, and feelings beyond words.

The *LTTA* national research reported here both complemented and extended prior research on arts education in several ways. First, the inclusion of control schools with another school-wide special curriculum focus, and regular schools without a specific school-wide curriculum focus, allowed for comparisons between *LTTA* schools and other types of schools. Winner and Cooper (2000) recommended this quasi-experimental design for studies on arts education and achievement. Second, the research takes into account the effect of socioeconomic status on achievement. Third, the research was designed to explore links between school achievement and attitudes toward school with out-of-school activities. And finally, with our qualitative data we could explore possible reasons for positive quantitative outcomes. We were particularly interested in the possibility of increased student engagement in school as a result of the *LTTA* curriculum. By engagement, we mean the involvement of the sensorimotor or physical, emotional, cognitive, and social dimensions (Csikszentmihalyi, 1997; Noddings, 1992). In addition, Csikszentmihalyi (1997) describes a transcendent dimension as "the very real feeling we have after an aesthetic encounter that some kind of growth has taken place, that our being and the cosmos have been realigned in a more harmonious way" (p. 25). We paid particular attention to engagement because we expected that any contributions made by the arts to achievement in other subjects were likely to be based on a variety of complex reasons, such as those offered by the notion of engagement as described above. Of course, it could also be that there are specific cognitive links between some of the arts disciplines and other subjects, such as the often-touted link between music and mathematics (Vaughn, 2000), and the less well-known links between the arts and language (Butzlaff, 2000; Parks & Rose, 1997). However, the exploration of such cognitive links is beyond the scope of this research.

RESEARCH OBJECTIVES

We established six research objectives over the course of the three-year study that encompassed issues related to students and their parents, teachers, artists, principals, *LTTA* site co-ordinators, and school district superintendents (Upitis & Smithrim, 2003a). We consider two of these research objectives in this article.

1. To determine if students in *LTTA* schools benefited from the program as evidenced by positive changes in attitudes towards the arts and learning and by achievement in mathematics and language.
2. To link students' school achievement with views and experiences of school subjects and out-of-school activities.

METHODOLOGY

Sites and Subjects

In 1999, The Royal Conservatory of Music extended letters to every school board or district in Canada describing the *LTTA* program and inviting interested boards and districts to identify schools that might take part. Schools were accepted (a) if they were willing to make a three-year commitment to the program and to the research, (b) if they agreed that all students and their teachers, from grades 1 through 6, would be involved by the end of the three years, and (c) if the teachers were provided with release time (equivalent to 2.5 days/year) for professional development. By this process, six sites were established with multiple schools at each site. The sites were in the Vancouver area, Calgary, Regina, Windsor, Cape Breton, and Western Newfoundland.

At the beginning of the study (July 1999), there were 8 to 11 *LTTA* schools at each site. From these schools, we selected a random sample of approximately 650 students per grade, with a staggered entry by grade over the three-year period, corresponding to the pattern by which the *LTTA* program was introduced. Students and teachers in grades 1 and 4 received *LTTA* programming in the first year (1999-2000), with grades 2 and 5 being added in the second year (2000-2001), and grades 3 and 6 added in the final year (2001-2002). The testing and survey schedule corresponded to the program structure, in that only grade 1 and 4 students were surveyed and tested in Year 1, with grades 1, 2, 4, and 5 students being surveyed and tested in Year 2, and students in grades 1 through 6 being surveyed and tested in Year 3. By the end of Year 3 there were 4063 *LTTA* students sampled from 55 *LTTA* schools.

At each site, we also selected control schools, almost half of which had a school-wide initiative in place that was not related to the arts. Most of them had an initiative focusing on the integration of technology across the curriculum. Other control schools had no special initiative in place. We matched control schools as closely as possible with the *LTTA* schools for size, location (e.g., urban vs. rural), and socioeconomic status. We sampled an additional 2602 students in total from the six sites from the two types of control situations. There were 15 special initiative and 20 regular schools involved in the study.

After parents/guardians consented to having their children involved in the research, we issued each student an identification code containing information about grade, type of school, and sex, maintaining confidentiality and anonymity throughout the process. Teachers indicated which students had special programs/accommodations in effect. We made accommodations for data collection for these students, and this information was coded along with other individual student information.

We had an overall attrition rate of approximately 32 per cent in the student population from year 1 to year 3 of our research program.

Instruments

We used both quantitative and qualitative instruments to gather data from students, parents, teachers, artists, and administrators. The quantitative tools included standardized achievement tests, holistically scored writing samples, and surveys regarding attitudes and practices. We gathered the qualitative data through open-ended survey questions, one-on-one interviews, and focus group interviews. A full compendium of instruments appears in *Learning Through the Arts™: Assessment Tools* (Upitis & Smithrim, 2003b).

We used a number of instruments as indicators of achievement. For students in grades 1 and 2, we used two problem-solving, criterion-referenced, constructed, response tasks for mathematics from the Canadian Achievement Tests. For grade 1, one task dealt with manipulating mathematical figures and the other with money concepts and attention to detail. For grade 2, one task involved interpreting graphs, and the other was a patterning problem. Students in grades 3 through 6 completed the appropriate levels of the Canadian Achievement Tests (CAT•3) for their grade. The reading tests measured abilities in comprehension, story sequencing, vocabulary, and grammar. The mathematics tests measured abilities in geometry, application of mathematical concepts, computation, and estimation. All students (grades 1 through 6) wrote letters of

appreciation according to a standardized prompt. These letters were used as writing samples, and were criterion-referenced and scored centrally (see Upitis & Smithrim [2003b] for the complete scoring rubrics).

We developed survey instruments for grades 1 through 6 to determine students' attitudes towards school and learning in general terms, and towards the arts and other subjects in particular. We also used the surveys to gather information regarding students' interests and activities outside school (e.g., reading for pleasure, playing videogames, watching television, playing sports, taking music lessons).

In years 2 and 3, researchers conducted focus group interviews for selected students in grades 5 and 6 at most of the sites. We designed these focus groups to help us understand and enlarge upon the achievement and survey data.

ANALYSIS

We entered the quantitative data into computer files for analysis with SPSS software (Norusis, 1993). We carried out double data entry for 10% of the data to ensure accuracy and consistency in data entry. Based on the double entry, we estimate that 97 per cent of the data were entered accurately.

We made group comparisons between those students in the *LTTA* program and those students in the two control conditions. In addition, we conducted factor analyses for students in grades 1 through 6, to help characterize their views and experiences with the arts, both within and outside school settings. We used student focus-group interviews to identify underlying reasons for differences in students' attitudes, interests, and achievement levels. We transcibed and analyzed focus group field notes and audiotapes using ATLAS.ti software, designed to parallel traditional methods of theory building based on a grounded theory approach to qualitative analysis (Glaser, 1978; Muhr, 1997). Several researchers in the research project coded the data from the focus group interviews; at least two members of the research team analyzed these data.

Baseline Results

We found no significant baseline differences on the comparison measures among students in the three types of schools in terms of socioeconomic status, achievement, attitudes towards school, participation in the arts, and parental values toward the arts (Upitis, Smithrim, Patteson, & Meban, 2001). This was also the case for teacher and principal beliefs and practices. Because of the lack of significant baseline differences, we could make legitimate

and meaningful comparisons between the different types of schools in Year 3 of the study.

FINDINGS

Student Achievement: Year 3 Results

We conducted simple statistical analyses and descriptions, such as cross-tabulations and *t*-tests, to determine possible group differences in year 3 of our research project. Analyses of means appear in the Table 1.

In the two cases where significant group differences were found in the means analyses, we conducted regression analyses to determine effect sizes. When the regression analyses were completed, we found higher performance for *LTTA* students only on the test of computation and estimation. This finding is now addressed in greater detail.

TABLE 1

Differences in Group Means in Pre- and Post-test Canadian Achievement Test Scores for Mathematics and Language and Writing Samples

	N	mean	S.D.	*t*	Df	sig.
Reading Comprehension						
LTTA schools	431	22.40	6.1			
Non-LTTA schools	300	22.03	6.2			
				.801	729	N.S.
Vocabulary						
LTTA schools	429	19.47	6.0			
Non-LTTA schools	300	18.98	5.9			
				1.107	727	N.S.
Writing						
LTTA schools	311	3.50	.85			
Non-LTTA schools	253	3.43	.90			
				.480	439	N.S.
Geometry and Applications						
LTTA schools	432	21.25	7.0			
Non-LTTA schools	291	20.24	6.4			
				1.969*	721	p=.049
Computation and Estimation						
LTTA schools	429	12.80	5.0			
Non-LTTA schools	286	11.44	4.8			
				3.619*	713	p<.001

* $p < .05$

Mathematics: Computation and Estimation. At the end of three years of *LTTA* programming, the grade-6 *LTTA* students (10- to 12-year-olds) scored significantly higher on tests of computation and estimation than students in the two types of control schools ($p < .05$). In terms of percentile differences, calculated by using the standard deviation of the *LTTA* group and the mean of the comparison group, the difference was equivalent to approximately 11 percentile points.

The single most important factor that determines scores on achievement tests is the ability of the individual child. In fact, the correlations between each of the five language and mathematics measures were very high ($p < .001$ in each case, with correlations ranging from 54 per cent to 75 per cent within subjects and 20 per cent to 57 per cent between subjects). In other words, children who scored well on one language measure likely scored well on both the other language measures and the math measures. In a related study, Ma and Klinger (2000) have shown that factors associated with the individual child account for up to 90 per cent of the variability in test scores. For this reason, we used performance on the mathematics tests in grade 4 (year 1 of the study) as the first step in the regression analyses.

That the *LTTA* program accounts for *any* of the variance in one of the mathematics scores is not trivial. As can be seen from the regression table, the *LTTA* program accounted for approximately 1.2 per cent of the variance. This was after previous performance in mathematics was considered, which accounted for most of the explained variance (24.3%), and after household income and mother's education had been taken into account, which together, accounted for another 1.3 per cent of the variance. Of the various out-of-school activities, music lessons also accounted for a small portion of the variance. No interaction effect occurred between socioeconomic factors and program type. Thus, insofar as there was a program effect, the benefits of the *LTTA* program occurred for children of all socioeconomic classes. The regression table summarizing the explained variance in computation and estimation scores appears in Table 2 (N=408).

School Subjects and Out-of-School Activities

To characterize students' views and experiences with the arts, both within and outside of the context of school-based arts activities, and their views and experiences of school subjects and schooling in general, we combined students in all three types of schools for factor analyses and employed standard methods for data reduction. That is, we used a principal component analysis as the extraction method for the various components, with Varimax notations. We report factor loadings for components at values of .30 or

TABLE 2

Regressions Predicting Mathematics Scores from Earlier Mathematics Scores, Household Income, LTTA Program and Music Lessons Out of School

	r^2	r^2 change	ß	*p*	*F*
Computation and Estimation:					
Step 1					
Grade 4 math score	.243	.243	.493	.000	136.06*
Step 2					
Grade 4 math score			.474	.000	
Household income	.256	.013	.121	.008	
Mother's education			.037	.414	48.32*
Step 3					
Grade 4 math score			.471	.000	
Household income			.104	.022	
Mother's education			.028	.528	
LTTA program	.268	.012	.110	.010	38.42*
Step 4					
Grade 4 math score			.466	.000	
Household income			.101	.026	
Mother's education			.041	.364	
LTTA program			.112	.008	
Music lessons	.275	.007	.084	.047	31.74*

* $p < .001$

greater. Eigenvalues were all greater than 1. We removed all double loading factors and have not reported them. Once we determined the factors, we correlated them to various other measures, including gender, household income, and achievement.

The factor analyses indicated strong patterns of practice and views on the arts and schooling held by children as young as six years of age. These patterns appeared to deepen over time, and, although some diversification occurred as children aged, many basic patterns were in place by grade 1. The general factors, as described below, correspond to all grades. However, we report correlations only for the grade-6 students.

When considering school and school subjects across the various grades, we found that three factors emerged. The first related to the enjoyment of the so-called "core" subjects. This factor did not correlate with gender, but positively correlated with achievement ($r = .11$ through .18, $p < .01$). The

second related to enjoyment of the arts. This factor correlated with gender ($r = .46$, $p < .01$), with girls more likely to be associated with this profile. This factor also positively correlated with language achievement ($r = .17$, $p < .01$). The third related to enjoyment of gym, computers, and working with friends, with boys more likely associated with this factor ($r = .16$, $p < .01$). This factor correlated negatively with one of the language measures ($r = -.11$, $p < .01$) and with household income ($r = -.14$, $p < .01$). The results of this factor analysis appear in Table 3 ($N = 614$).

TABLE 3

Views of School and School Subjects: Principal Component Analysis with Varimax Rotation

Component	Factor 1: Core	Factor 2: Arts	Factor 3: Computer/ Gym/Friends
I like language arts	0.58		
I like math	0.57		
I like social studies	0.74		
I like science	0.75		
I would like to do more language arts	0.58		
I would like to do more math	0.62		
I would like to do more social studies	0.72		
I would like to do more science	0.74		
I like music		0.65	
I like drama		0.78	
I like dance		0.80	
I would like to do more music		0.67	
I would like to do more drama		0.80	
I would like to do more dance		0.82	
I like gym			0.70
I like to use the computer			0.54
I like working in groups with my friends			0.43
I would like to do more gym			0.75
I would like to spend more time using computers at school			0.64
Reliability Co-efficients	.85	.86	.65

Consideration of the students' out-of-school activities produced similar patterns of results: girls were more likely to engage in arts activities ($r = .21$, $p < .01$), while boys were more likely to engage in solitary or screen-related activities ($r = .27$, $p < .01$). The latter factor also correlated negatively with language achievement ($r = –.14$, $p < .01$) and household income ($r = –.14$, $p < .01$). A third factor for out-of-school activities described those students who read for pleasure, took music lessons, or belonged to clubs. This factor correlated weakly with all four achievement measures ($r = .10$ through .14, $p < .01$) and household income ($r = .14$, $p < .01$). The results of this factor analysis, for grade-6 students only, appears in Table 4 (N=614).

Of the three sets of factors analyzed, the factors relating to the arts, both in and out of school, were the most complex, and varied most from grade to grade. It would require a separate paper to describe these factors fully. Generally speaking, however, those students who enjoyed school arts were not involved in arts activities outside of school, and those who were engaged in the arts outside of school indicated no desire for more school arts instruction. The one exception to this pattern was a factor relating to music: students who were engaged in music outside of school were also likely to enjoy music in school.

TABLE 4

Out-of-school Activities: Principal Component Analysis with Varimax Rotation

Component	Factor 1: Core	Factor 2: Solitary	Factor 3: Reading/ Music
Out of school I take drama lessons	0.80		
Out of school I take visual arts lessons	0.70		
Out of school I take dance lessons	0.72		
Out of school I sing in a group	0.66		
Out of school I listen to music		0.53	
Out of school I play video games		0.72	
Out of school I watch TV		0.69	
Out of school I play alone		0.47	
Out of school I read for fun			0.57
Out of school I take part in clubs			0.52
Out of school I take music lessons			0.65
Reliabity Co-effiecients	.70	.47	.37

Engagement

Our analysis provided strong indications that involvement in the arts went hand-in-hand with engagement in learning at school. In interviews and on surveys, *LTTA* students, teachers, parents, and administrators talked about how the arts engaged children in learning, referring to the cognitive, physical, emotional, and social benefits of learning in and through the arts. The cognitive benefits of the *LTTA* program were described in the following kinds of ways:

They are so attentive during the artist's stay and therefore learn more. (teacher)

She is more diligent about doing homework and remembering important information. She is more excited about school and her subjects, even the ones she isn't particularly fond of. (parent)

A high percentage of students (78%) expressed a strong desire for more physical education in school. Because most *LTTA* activities involved movement, it was not surprising that many people commented on the benefits of physical activity. A sample of such comments appears below:

The dramatics — being able to act out the life cycles of the frog and butterfly — the children really learned those lessons — experiencing it physically made the difference. (teacher)

LTTA reinforced the fact that all children, even those with physical and mental limitations, can learn and enjoy through movement. (artist)

There is evidence that learning requires emotional involvement (Goleman, 1995). Comments like these show how important this aspect of the program was for participants:

LTTA opens up the door for how you can express yourself. (grade-6 student)

The arts taught us how to bring out inner feelings, how to cooperate, listen, and express ourselves through movement. (grade-6 student)

Students, parents, teachers, and administrators valued the social benefits, such as the growth of self-esteem, which they attributed to *LTTA*.

Arts are important to meet new people, make friends, stay out of trouble, and be with a "good group." (grade-6 student)

My daughter is more interested in everything going on. She seems to be more outgoing and interested in the other students. (parent)

LTTA got a whole bunch of people working together. Willingly. This increases their teamwork; everyone walks in the same direction for a while. (teacher)

In a few cases, effects of the *LTTA* program could be described as transcendent, that is, going beyond the perceived limits of physical, cognitive, social, and emotional experience and moving towards deep transformation of personal beliefs and practices (Csikszentmihalyi, 1997). For example, in one case, an elective mute student chose to speak for the first time in the school year when the drama artist was in the class doing a drama unit on traditions.

In addition to the qualitative evidence, quantitative findings also supported the speculation that *LTTA* children were engaged at school (and may therefore have performed better on tests of computation and estimation). For instance, by the end of the three-year study, grade-6 girls in *LTTA* schools were happier to come to school than their peers in the other kinds of schools ($p < .05$). This difference did not exist at the beginning of the study when the children were in grade 4.

CONCLUSION

The purpose of art is not the release of a momentary ejection of adrenaline but rather the gradual, lifelong construction of a state of wonder and serenity. — *Glenn Gould*

In our view, one of the most important findings was that students' involvement in the arts in the *LTTA* schools did not come at the expense of achievement in mathematics and language. Further, the results indicated that the *LTTA* program had a modest but statistically significant positive effect on student achievement on the math test dealing with computation and estimation. Equally important was the fact that this difference did not occur until three years of programming had taken place. These kinds of effects are not sudden, but gradual.

Why did the changes occur in mathematics scores? The survey and interview data provided strong evidence that students in the *LTTA* schools were highly engaged at school. This observation has led us to speculate that the differences in computation scores were due to the students' being more engaged, generally, in the *LTTA* schools than in the comparison schools. Given this, it is not altogether surprising that there would only be a change in the achievement scores dealing with computation. Computation is the kind of task that can be improved by paying closer attention to the material

at hand — by being more fully awake and engaged in the task. It is much easier to improve a computation score than, for example, a reading score, where much more language knowledge and comprehension is needed to make a significant change.

The trends that were revealed regarding students' views of school subjects, of schooling, and of the arts both within and outside of school, indicated that subject preferences are present as early as grade 1 and remain stable through the elementary grades. Of the three school-related factors (core subjects, arts, and gym/computers/friends), the second and third factors most fully embody the visual-spatial, interpersonal, and bodily-kinaesthetic forms of knowledge as described by Gardner (1993). However, schools tend to emphasize other forms of knowledge, most notably linguistic and logical-mathematical knowledge, both of which are contained in the first factor. If we are to engage all students fully in school, then it would be wise to pay particular attention to the second and third factors, and to the forms of knowledge that are embedded in those factors.

Students' views of the arts, both in and out of school, added another dimension to the profiles arising from an examination of the arts as part of the school experience. With the exception of music, those students who enjoyed school arts were not involved in arts activities outside of school, and those who were engaged in the arts outside of school indicated no desire for more school arts instruction. A deeper understanding of these factors or profiles is essential in terms of modifying arts experiences in schools so that all children are engaged by some form of the arts at school. The complexity of this factor points to the importance of arts programs that are responsive to meeting the needs of children with differing experiences and preferences. This is entirely possible, even within the context of elementary schooling. Indeed, even though some students reported that they didn't like the arts in schools, teachers and artists commented over and over again how surprised they were that all students were able to involve themselves in the *LTTA* activities. Several reasons for this discrepancy between the self-reported data and the response to the *LTTA* arts experiences come to mind. First, conformity to a group of peers can have a strong effect on self-reported preferences. It could be that students surprise themselves when they find they enjoy certain kinds of arts activities, even though they claim that they don't like the arts. Many students commented that the artists were interesting, happy, and enthusiastic about their work. It could be that arts in the context of professional artists seem real and worthwhile, while other school arts experiences may appear contrived and trivial.

In any case, it is obvious that a variety of arts experience is necessary to

engage all individual and groups of students. In a study of music education practices in England, Sloboda (2001) concluded that the key concept in a viable arts education for today's students is variety — variety in providers, in funding, in locations, in roles for educators, in trajectories, in activities, in accreditation, and in routes to teacher competence. Sloboda suggested that teachers must take on a wider range and variety of roles. In the case of music education, Sloboda suggested that those roles might include teacher, animateur, coach, mentor, impresario, fund-raiser, programmer, composer, arranger, and studio manager.

It is also important for arts educators to expand their own views of what constitutes art. For example, Barone (2001) describes an Appalachian art teacher who taught the following in his high school visual arts program: macramé, pottery, fibres, weaving, drawing, photography, silk-screening, papermaking, batik, stitchery, quilting, lettering, and airbrushing. Music education now includes, in addition to the traditional trio of choir, band, and orchestra, computer-assisted composition, steel band, fiddle, folk music, popular music, soundscapes, music from many cultures, jazz band, jazz choir, Orff, Kodaly, Dalcroze Eurhythmics, guitar, synthesized music, technological enhancement of sound, and more. With enough variety in arts curricula and modes of arts experience, gender differences in arts preferences may well decrease, and student preferences, engagement, and achievement in general could be further altered for the better.

Implications for Further Research

One issue worthy of immediate investigation is whether the modest gains in mathematics achievement will be robust over time: further longitudinal research will determine whether the positive change in mathematics scores for *LTTA* students was momentary or long lasting. Part of the cohort of grade-6 students who have been described in this article will be followed for an additional two years to determine whether they perform significantly higher on tests of computation than their peers when all of the students are in grade 8. In a similar vein, although no statistical differences occurred in language measures (reading and writing), such differences might emerge over time. This is another issue that is now being studied in one of the original sites in the extended (5-year) longitudinal study.

Replication of the present study is also desirable. Although the present study adds substance to the growing body of literature, providing both correlational and causal evidence of the association between arts and achievement in other subjects, any study of this type and scope needs to be replicated in a variety of situations to draw any further conclusions. Further

investigations should also explore the reasons why girls appear more likely to engage in and enjoy the arts. A related area for investigation might involve determining if school cultures and existing teaching practices contribute to these gender trends, and how arts programs might consequently be modified to engage all students more deeply in arts experiences.

The issue of engagement requires further elaboration. By engagement, we mean the sense of being wholly involved. This word comes from the French term *engagé*, which, when used to describe a writer or artist, means morally committed. It is this commitment — the physical, emotional, intellectual, and social commitment — that emerged again and again in written and oral reports of the *LTTA* experience by students, teachers, administrators, parents, and artists. Thousands of comments noted such things as joy, attentiveness, and motivation. The eloquence of one student's comment may reflect the essence of the relationship between involvement in the arts and learning: "Music brightens up the mind. When you learn something new, you feel good, and that makes you feel good in other subjects like math" (grade-6 student). Given the compelling evidence about engagement collected thus far, it is important to delve more deeply into how engagement might explain any gains in academic achievement, relating such gains to the particular contributions of the arts, and how such contributions might affect transfer and/or engagement. This could be done in a number of ways. One way would be to focus on the students who have exhibited the greatest changes. Another approach would be to design a research study to test the engagement hypothesis, that is, to see if students are actually more engaged during arts activities than during other school activities and whether there are higher levels of overall engagement, independent of subject and activity, in arts-rich schools. This hypothesis could be tested by using an experience sampling method, such as the one employed by Csikszentmihalyi (1993).

There may be other general factors — beyond engagement — that the arts nurture. Comments by research participants regarding the importance of the arts as a form of motivation for taking other academic work more seriously, and the importance of the discipline required in pursuing the arts (both within and outside school) would suggest a number of general benefits to arts study that can have positive influences on other pursuits. Further, the research literature, along with our findings, suggests that there may be domain specific links — such as those between mathematics and music, or movement and reading — and such links bear further exploration. Despite the limitations inherent in any single research study — even one of this scope — it is abundantly clear that the students in the *LTTA* program benefited from the experience in myriad ways. Some of these benefits lent

themselves to measurement such as gains in computation test scores. Others were more ephemeral, but perhaps even more important in the long term. It is our hope that the students, artists, and teachers involved in this project will, as Glenn Gould so eloquently put it, be involved in the "lifelong construction of a state of wonder and serenity."

ACKNOWLEDGMENTS

The authors of this report gratefully acknowledge the assistance provided by all of the members of the national research team. We are especially grateful to Angela Elster, Eric Favaro, Janice Finkle, Sandra Falconer Pace, Marg Guillet, Kit Grauer, Rita Irwin, Catherine Jordan, Matt King, Cathy MacNeil, Ann Patteson, Alison Pryer, and Jun Qian. We are also grateful to our Queen's colleagues, John Kirby, Don Klinger, and Lesly Wade-Woolley, and for the financial support of the Social Sciences and Humanities Research Council of Canada, and The Royal Conservatory of Music through the generosity of the George C. Metcalf Foundation, and the Canadian Pacific Charitable Foundation.

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